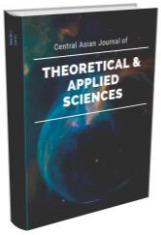

CENTRAL ASIAN JOURNAL OF THEORETICAL AND APPLIED SCIENCE

https://cajotas.centralasianstudies.org/index.php/CAJOTAS

Volume: 06 Issue: 04 | October 2025 ISSN: 2660-5317

Article

Isolation and Identification of Staphylococcus aurous in Packaged Milk

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Abstract: Milk serves as a good nutrient medium for the growth of many types of microorganisms. Therefore, it can get dirty during milking, transport, and storage. The bad germs (pathogens) in milk and milk products which are most common and dangerous are Staphylococcus aureus since they make special poisons (enterotoxins) that hurt people when eaten. Aims: Detection of Staphylococcus aurous bacteria in milk sold in Iraqi markets for the purpose of quality and safety of canned milk. Methods: This work tries to find the Staphylococcus aureus germ from milk samples packaged milk sold in markets of Karbala, Diyala, Basra Wasit governorates between October 2021 and March 2022. Fifty samples were taken and put on a special plate called Mannitol Salt Agar then kept at 37°C for up to 48 hours. Bacteria grew only on six plates; one of them- number 21 had with 74 colonies the highest count. Results: The results indicate a reduction in the standards of hygiene during milking and handling operations, basically reflecting unhealthy practices. This serves to bring out an invisible challenge in our local markets; hence these findings are very relevant to public health decision-makers. It should strengthen their oversight of the milk production as well as distribution chains for consumer safety.

Keywords: Milk, Contamination, Staphylococcus Aureus, Bacteriological Study

Citation: Jebur A. L., Amir A. H. A. Isolation and Identification of Staphylococcus aurous in Packaged Milk. Central Asian Journal of Theoretical and Applied Science 2025, 6(4), 672-676.

Received: 30th Jun 2025
Revised: 07th Jul 2025
Accepted: 29th Jul 2025
Published: 15th Aug 2025

1. Introduction

A staple of the human diet, milk is recommended as healthy in many nations without exception.. It provides essential nutrients that are difficult to obtain from dairy-free diets, such as vitamins, minerals, and amino acids [1]. In addition to its nutritive and beast benefactions, Milk serves as a favorable for the growth of various bacteria. Dairy cows can carry their bacteria and release them in their udder. thus, Milk may be contaminated with pathogens and therefore, as a result of udder conditions similar as mastitis [2]. Because of poor storehouse practices, poor cleanliness, a lack of particular defensive outfit, and inadequate health control, numerous conditions spread by food pitfalls are more common in fat nations than in less developed countries. Staphylococci thrive in these nations because Milk is manufactured in hygienic and unsterilized conditions. Generally, contagious ails are brought on by these ails [3]. still, outbreaks of milk- borne conditions have been reported in fat countries despite strict quality norms, pasteurization of milk, and advancements in the health and weal of dairy cows [4].One way that bacteria can be excluded is through foodborne bacteria impurity. They're particularly native, but humans, because of their constituents-rich niche, produce the ideal conditions for bacteria to grow fleetly and produce food [5]. The Centers for Disease Control and Prevention reports that

the most common cause of hospitalizations due to foodborne illness is defiled milk and dairy products [6]. Staphylococcus aureus food poisoning is the most common foodborne infection worldwide, after Salmonella food poisoning [7]. Staphylococcus bacteria are gram-positive bacteria and are set up in different corridor of the body similar as the skin and nose, which makes them fluently transmitted, so they're responsible for a number of conditions [8,9]. Food spilage due to staphylococcus bacteria, which also shortens its shelf life. also, the enterotoxins produced by these bacteria have the eventuality to beget food poisoning and, in some cases, indeed deathDue to effects like handling procedures, storehouse conditions, use of unsanitary outfit, abusing conditions, and the inheritable diversity of pathogenic bacteria, the frequence of S. aureus varies between granges and dairies. [10,11].Staphylococcus bacteria are one of the main causes of mastitis because they can be set up in the mammary gland, the skin, or the nose of the beast. They can also be set up in the milk itself or they can pollute the abusing point or workers' hands [12].

[13]. Staphylococcus and numerous other microorganisms consider raw milk a good growth medium. Staphylococcus causes numerous conditions and is one of the most important foodborne pathogens. [14]. As milk is the ideal medium for complex microbial systems, it's responsible for the wide variations in the taste, smell, and texture of milk and is the primary source of processing, handling, and unsanitary [15]. .impurity of raw milk and dairy cows with Staphylococcus aureus remains a major problem in the dairy assiduity. Foodborne illness outbreaks associated with defiled dairy products emphasize the significance of Staphylococcus aureus to public health [16].. Dairy animals are the primary source of S. aureus impurities in raw milk. In dairy manufacturing, Foodborne illness outbreaks associated with defiled dairy products illustrate the significance of S. aureus to public health. Dairy creatures are presumably the main source of S. aureus impurity of raw milk [17].

2. Materials and Methods

a. Study Area and Sample Collection

Fifty packaged milk samples were collected from markets in the Iraqi governorates of Diyala, Wasit, Basra, and Karbala between October 24, 2021, and March 19, 2022. After collection, the samples were transported to the laboratory under suitable conditions in preparation for culturing.

b. Cultural Medium

Mannitol Salt Agar (MSA) was used as the selective medium in this study. It was prepared according to the manufacturer's instructions, sterilized by autoclaving at 121°C for 15 minutes, and poured into sterile Petri dishes. Staphylococcus aureus appears as yellow colonies on MSA due to its ability to ferment mannitol. The elevated salt concentration in the medium acts as a selective factor by restricting the growth of most other bacterial species [18].

c. Sample Culture

One milliliter of each milk sample was inoculated onto Mannitol Salt Agar and incubated at 37°C for 48 hours. After incubation, yellow colonies were manually counted. A marker was used to mark each colony to ensure accurate enumeration and avoid double counting.

3. Results and Discussion

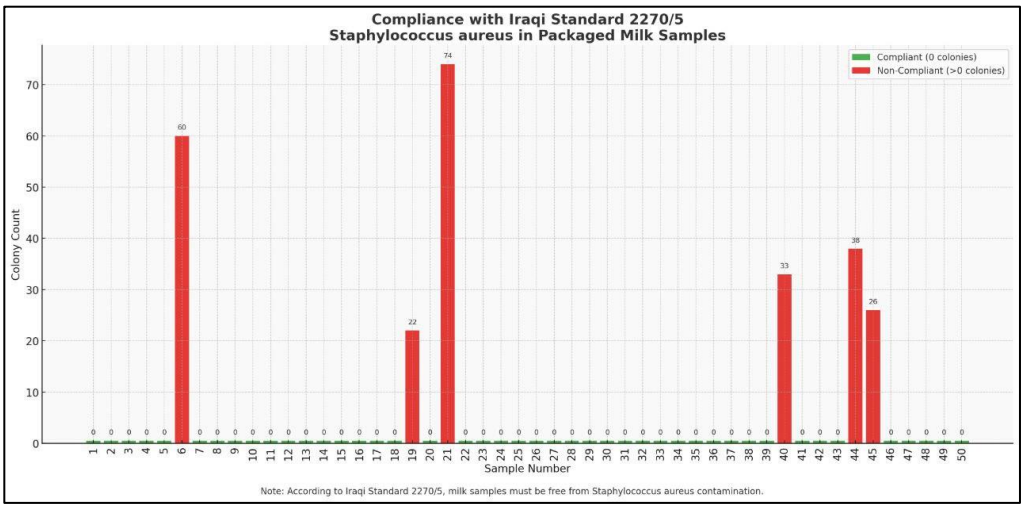

Figure 1. Compliance of Packaged Milk with Iraqi Standard 2270/5 on *Staphylococcus aureus* Contamination.

Results of bacteriological tests carried out on packaged milk showed contamination with Staphylococcus aureus in 6 out of 50 samples, representing 12% of all the samples studied. This percentage is alarming, more so because it is assumed that processed (canned) milk has undergone further processing to ensure it is free from pathogenic microorganisms.

Sample 21 showed maximum contamination with the maximum number of bacterial colonies (74 colonies). Sample 19 showed minimum contamination with 22 colonies. The variation in the counts of the colonies shows that there were different levels of contamination, and more frequently, it reflects differences in hygienic conditions during production, packaging, or transportation. The Iraqi Standard No. 2270/5 has imposed a rule for Bacteriological Limits in Foods that dairy products should not contain any pathogenic bacteria; this includes Staphylococcus aureus. Therefore, these six samples above are not to standard specifications; hence they are unfit for human consumption. The results indicate a fall in the standards of hygiene during milking and handling operations, which basically reflects unhealthy standard practices. This study brings out an unseen challenge in local markets and hence its findings are very germane to public health decision-makers. There is an underscoring need to strengthen the health oversight of the milk production and distribution chain based on these findings for consumer safety.

4. Conclusion

Based on the data collected in this study, it is clear that processed and packaged milk, despite the manufacturing process, is not completely immune to the risk of bacterial contamination. Tests revealed the presence of Staphylococcus aureus bacteria in a number of samples, reaching up to 12% of the total. This suggests deficiencies at certain stages of production, whether during milking, transportation, or even packaging. Some samples recorded particularly high contamination rates, such as Sample 21, indicating fundamental problems with the health measures implemented for these samples. Conversely, the vast majority of samples were free of contamination, which is encouraging, but it does not diminish the importance of tracking down cases where contamination has occurred and working to identify and address their causes. Notably, the contaminated samples fail to meet the requirements of Iraqi Standard Specification No. 2270/5, which stipulates that milk must be free from pathogenic bacteria.. This means that these products are unfit for human consumption, and immediate action must be taken to prevent their spread and circulation. Overall, these results underscore the need to strengthen health controls and implement sterilization and hygiene procedures with the utmost precision and rigor

throughout all stages of canned milk production, to ensure product safety and protect consumer health.

Recommendations

a. Improving production safety: Strengthening sterilization and cleaning methods during the milking and packaging stages.
b. Inspecting transportation and storage: Ensuring that proper and hygienic transportation and storage procedures are implemented.
c. Regularly cleaning equipment: Implementing advanced sterilization methods and conducting periodic tests to verify effectiveness.
d. Strengthening official oversight: Increasing inspection visits to milk production facilities to ensure compliance with health regulations.
e. Developing food quality standards: Establishing clear criteria for testing milk to ensure it is free of any contaminants.
f. Education and training: Raising awareness among workers and breeders about the necessary hygienic practices.
g. Investing in modern detection technologies: Supporting studies aimed at developing effective methods for detecting any contamination in milk.

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